Competitive Pressure on China

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Discussion paper

Competitive Pressures on China: Income Inequality

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Abstract

In the preceding paper we have seen that the top types of labor are relatively scarce in China and this raises the issue of income inequality under competition. Our main finding is that inequality would multiply indeed. Subsidiary, the nature of inequality would shift from the rural-urban divide to differences between social classes. The existing negative relationship between development and inequality would be dissolved by competition.

Keywords: Competition, Income inequality, Development, China

JEL-classification: D13, O15, O18, R11, O53

Competitive Pressures on China: Income Inequality

1. Introduction

China is a socialist country and its degree of income inequality is fascinating material. Has China a more equal distribution of income? And will China face more inequality as it unleashes the forces of competition? We will document the inequality of income by the well-known rural-urban divide, as well as by province and social class, and will analyze how competition would influence the results.

In the preceding paper (ten Raa and Pan, this issue) we have calculated the marginal productivities of the various types of labor and capital in China; these are the factor rewards that would prevail under perfect competition. We have seen that the top types of labor are relatively scarce and this raises the issue of income inequality under competition. In addition to the input-output database presented in the preceding paper, we need two more data sets. To assign functional incomes to earners, we need their claims to the various sources of income or property titles of the different types of labor and capital, all differentiated by location. And to spread the income of earners among all individuals, we need household size statistics.

Our main finding is that inequality would multiply under competition indeed. Subsidiary, the nature of inequality would shift from the rural-urban divide to differences between social classes. We measure inequality by the so-called Theil index, which admits a decomposition of inequality in between and within inequalities when the population is divided into groups. As our division is three-way (rural-urban, provinces, and social classes), there is a slight theoretical problem, which we have not encountered in the literature, namely that the order of division in subgroups influences the decomposition of inequality with respect to the various dimensions.

The remainder of this paper is structured as follows. Section 2 reviews the literature on Chinese inequality. Section 3 extends the Theil index to more dimensions of population subgroups and describes the database. Section 4 presents the actual and competitive income distributions. Section 5 focuses on inequality between and within the rural and urban areas. Section 6 focuses on inequality between and within the provinces. Section 7 concludes: among other things, the existing negative relationship between development and inequality would be dissolved by competition.

2. The literature on inequality in China

China is thought to have less inequality than other developing countries. The State Statistical Bureau found a Gini coefficient for China in 1979 of 0.33. Griffin et al (1994) estimated it 0.38 for China in 1988 and found this low in comparison to other Asian developing countries. To understand this, income inequality was measured for the rural and urban areas separately. Unlike other Asian countries, China was found to feature less urban income inequality than rural income inequality. Zhu and Wen (1990) found a Gini coefficient for rural areas in 1988 of 0.3 and subsequently Griffin et al (1994) confirmed it to be 0.33, but only 0.23 for urban areas, all for 1988. Similarly, Wang et al (1995) found that the 1993 rural and urban Gini coefficients were 0.33 and 0.24, respectively. Most of these studies agree that more unequally distributed sources of income are relatively more sizeable in rural areas than in urban areas. Griffin et al (1994) pointed out that rural inequality derives from farmer's non-production income, whereas in urban areas staff and workers earn very similar wages.

The difference between rural and urban inequality has been ascribed to the unbalanced development of the two areas. Wang et al (1995) compared the mean income levels between the rural and urban areas over the period from 1978 to 1994. In the first stage, dated 1978-1985, the gap between rural and urban income levels had

decreased. Rural economic reform had advanced farmer's income levels more than those of the urban dwellers. In the second stage, dated 1985-1994, urban economic reform reversed the picture, advancing urban income levels relatively forcefully and thus widening the gap.

Few studies have explicit results on the relationship between inequality and development, which requires provincial or at least regional breakdowns. Griffin et al (1994) compared the incomes in rural areas among all provinces and the incomes in urban areas among ten provinces, for 1988. They were unable to ascribe provincial differences to rural and urban income levels. However, Wang et al (1995) established a 2.58 : 1.16 : 1 ratio for rural income levels in eastern, middle, and western China, respectively. They also compared the rural income levels between provinces in each of the three regions and found that the eastern provinces show great income variation, but the middle and western provinces little. Similarly, they established a 2.13 : 0.89 : 1 ratio for urban income levels in the three regions and drew a similar conclusion as for rural income variation. Their analysis was crude, as they used a representative province for each region. Yang (1992) and Wei (1992) calculated the relative mean deviations from per capita GNP in 1989 for the eastern, middle, and western regions and the constituent provinces, and their findings are similar to those of Wang et al (1995).

Inequalities within provinces have been investigated more frequently, both for rural and for urban income. Zhu and Wen (1990) and Griffin et al (1994) calculated all provincial Gini coefficients for rural income. For comparison, their results are included in Table 1 below. Griffin et al (1994) calculated ten provincial Gini coefficients for urban income. As for rural income, they found no relationship between inequality and the level of economic development.

3. Theil index for higher dimensions and data description

Consider a population of *N* individuals with given income shares. If the population is partitioned in one way between *G* groups of size N_g, individual income shares are denoted y_{gj}, $j = 1, \ldots, N_g$, and group income shares are denoted Y_g, $g = 1, \ldots, G$, then the Theil (1967) index of inequality can be written as

$$\sum_{g=1}^{G} Y_g \log \frac{Y_g}{N_g / N} + \sum_{g=1}^{G} Y_g \sum_{j=1}^{N_g} \frac{y_{gj}}{Y_g} \log \frac{y_{gj} / Y_g}{1 / N_g}$$

where the first term is between-group inequality and the second term total within-group inequality.

The typical case is the division between rural and urban income ($g = 1$ and 2, respectively). But now refine each group into H subgroups of size N_{gh}, $h = 1, \ldots, H$. The typical case is a subdivision in provinces. If we denote the individual income shares by y_{ghj}, $j = 1, \ldots, N_{gh}$, and subgroup income shares by Y_{gh}, then inequality can be rewritten as

$$\sum_{g=1}^{G} Y_g \log \frac{Y_g}{N_g / N} + \sum_{g=1}^{G} Y_g \sum_{h=1}^{H} \frac{Y_{gh}}{Y_g} \log \frac{Y_{gh} / Y_g}{N_{gh} / N_g} + \sum_{g=1}^{G} Y_g \sum_{h=1}^{H} \frac{Y_{gh}}{Y_g} \sum_{j=1}^{N_{gh}} \frac{y_{ghj}}{Y_{gh}} \log \frac{y_{ghj} / Y_{gh}}{1 / N_{gh}}$$

where the first term is between-group inequality, the second term between-subgroup inequality, and the third term total within-subgroup inequality. Inequality is the sum of rural-urban inequality, provincial inequality, and social inequality.

Now we could have changed the order of grouping, first dividing China in provinces, and then dividing provinces in rural and urban areas. Then inequality is the sum of provincial inequality, rural-urban inequality, and social inequality, but the numbers could be different. Total inequality would still be the same, as would be the third terms, representing total within-subgroup or social inequality. The leading terms,

representing rural-urban inequality and provincial inequality, would have the same sum, but the division could differ.

Anyway, what we need for these inequality measurements are personal incomes by rural and urban areas, province, and social class, both for the observed economy and for the hypothetical, purely competitive economy. The data on population and personal income statistics have been collected as described in Appendix 1 and are presented in Appendices 2 and 3, respectively. The incomes under perfect competition are derived from the factor input prices obtained in the preceding paper, using the full mobility scenario. We must allocate these earnings among eight social classes: four types of labor (unskilled, skilled, managers, and technicians), the self-employed, capitalists, retirees, and dependants. For labor income this is obvious, but not for capital. Moreover, we must redistribute income from earners to individuals by taking into account family sizes. The transformation of the functional to the personal distribution of income is detailed in Appendix 4.

4. Overall personal income inequality

The inequality measures in the literature, provincial Gini coefficients for rural income, are presented in Table 1, along with our own calculation for comparison. The first column ranks the provinces by farmers' income levels, in declining order. The second, third, and fourth columns provide the Gini coefficients of Griffin et al (1994), Zhu and Wen (1990), and this study, respectively. The fifth column provides the Theil index, and foreshadows the first column of Table 2. The second column of Table 2 provides urban inequality. A weighted average of the two yields the inequality within areas, given in column 3. If we add the inequality between the rural and urban economies, given in column 4, we obtain the Theil index of any province, in column 5. Columns 3 and 4 are reproduced as percentages of provincial inequality in columns

Table 1. Income Inequalities in Rural China

	Per capita income of farmers in 1988	1988 Gini coefficient; Griffin, et al. (1994)	1988 Gini coefficient; Zhu and Wen (1990)	1992 Gini coefficient; This study	1992 Theil index; This study
Shanghai	1301	0.222	0.215	0.312	0.0323
Beijing	1063	0.305	0.233	0.271	0.0553
Zhejiang	902	0.286	0.298	0.266	0.0555
Tianjin	891	0.394	0.256	0.259	0.0521
Guangdong	809	0.306	0.305	0.249	0.0392
Jiangsu	797	0.383	0.299	0.282	0.0294
Liaoning	700	0.330	0.300	0.254	0.0333
Jilin	628	0.354	0.264	0.247	0.0184
Fujian	613	0.290	0.218	0.256	0.0245
Shandong	584	0.285	0.267	0.225	0.0484
Hainan	567	0.276	0.283	0.253	0.0267
Heilongjian	553	0.368	0.294	0.251	0.0157
Hebei	547	0.293	0.289	0.228	0.0459
Hunan	515	0.255	0.212	0.242	0.0257
Neimenggu	500	0.339	0.293	0.245	0.0233
Hubei	498	0.231	0.229	0.242	0.0252
Xinjiang	497		0.323	0.243	0.0325
Qinghai	493	0.313	0.325	0.251	0.0232
Jiangxi	488	0.230	0.201	0.247	0.0280
Anhui	486	0.249	0.207	0.238	0.0267
Ningxia	473	0.273	0.315	0.237	0.0240
Sichuan	449	0.265	0.241	0.226	0.0276
Shanxi	439	0.320	0.275	0.240	0.0431
Yunnan	428	0.287	0.259	0.236	0.0249
Guangxi	424	0.291	0.279	0.234	0.0231
Shaanxi	404	0.289	0.263	0.238	0.0275
Henan	401	0.299	0.250	0.238	0.0230
Guizhou	398	0.295	0.234	0.234	0.0167
Tibet	374		0.279	0.248	0.0181
Ganshu	340	0.263	0.248	0.230	0.0262

Table 2. Income Inequalities in the Observed Chinese Economy

Province	Code	Rural in-equality	Urban inequality	Across areas	Between areas	Provincial inequality	Across areas	Between areas
Eastern								
Beijing	BJ	0.0553	0.0328	0.0372	0.0058	0.0430	87%	13%
Tianjin	TJ	0.0521	0.0256	0.0321	0.0039	0.0360	89%	11%
Hebei	HB	0.0459	0.0327	0.0411	0.0342	0.0753	55%	45%
Liaoning	LN	0.0333	0.0401	0.0378	0.0187	0.0565	67%	33%
Shanghai	SH	0.0323	0.0209	0.0239	0.0062	0.0301	79%	21%
Jiangsu	JS	0.0294	0.0297	0.0295	0.0221	0.0516	57%	43%
Zhejiang	ZJ	0.0555	0.0515	0.0543	0.0005	0.0548	99%	1%
Fujian	FJ	0.0245	0.0905	0.0471	0.0189	0.0660	71%	29%
Shandong	SD	0.0484	0.0445	0.0472	0.0016	0.0488	97%	3%
Guangdong	GD	0.0392	0.0662	0.0512	0.0054	0.0566	90%	10%
Middle								
Shanxi	SX	0.0431	0.0326	0.0379	0.0422	0.0801	47%	53%
Neimeng	NM	0.0233	0.0461	0.0357	0.0296	0.0653	55%	45%
Jilin	JL	0.0184	0.0455	0.0343	0.0235	0.0578	59%	41%
Heilongjiang	HLJ	0.0157	0.0436	0.0323	0.0114	0.0437	74%	26%
Anhui	AH	0.0267	0.0580	0.0379	0.0391	0.0770	49%	51%
Jiangxi	JX	0.0280	0.0585	0.0377	0.0160	0.0537	70%	30%
Henan	HeN	0.0230	0.0455	0.0303	0.0398	0.0701	43%	57%
Hubei	HuB	0.0252	0.0355	0.0297	0.0218	0.0515	58%	42%
Hunan	HuN	0.0257	0.0523	0.0346	0.0297	0.0643	54%	46%
Western								
Guangxi	GX	0.0231	0.0682	0.0371	0.0363	0.0734	51%	49%
Hainan	HN	0.0267	0.1082	0.0668	0.0648	0.1316	51%	49%
Shichuan	SC	0.0276	0.0467	0.0343	0.0257	0.0600	57%	43%
Guizhou	GZ	0.0167	0.0628	0.0323	0.0259	0.0582	55%	45%
Yunnan	YN	0.0249	0.0448	0.0316	0.0488	0.0804	39%	61%
Tibet	TB	0.0181	0.1045	0.0484	0.0821	0.1305	37%	63%
Shaanxi	ShX	0.0275	0.0393	0.0328	0.0587	0.0915	36%	64%
Gansu	GS	0.0262	0.0407	0.0334	0.0804	0.1138	29%	71%
Qinghai	QH	0.0232	0.0461	0.0365	0.0977	0.1342	27%	73%
Ningxia	NX	0.0240	0.0372	0.0312	0.0771	0.1083	29%	71%
Xinjiang	XJ	0.0325	0.0496	0.0424	0.0601	0.1025	41%	59%
Across provinces		0.0324	0.0455	0.0380	0.0284	0.0664	57%	43%
Between provinces		0.0243	0.0163	0.0208		0.0208	100%	0%
Theil's inequality		0.0567	0.0618	0.0588	0.0284	0.0872	67%	33%
Across provinces		57%	74%	65%	100%	76%	44%	
Between provinces		43%	26%	35%	0%	24%		

6 and 7, respectively. For example, in Beijing the rural-urban divide contributes only 13% to inequality, but in Tibet the share is 63%.

Having explained all the provincial Theil indices, we now turn to the bottom of Table 2. The analysis is quite similar. Take the first column, rural inequality. A weighted average of all the provincial Theil indices yields the inequality within the provinces, 0.0324. If we add the inequality between the provinces, 0.0243, we obtain the Theil index for rural inequality in China, 0.0567. The two contributing terms are reproduced as percentages at the bottom. The explanations of urban inequality (column 2) and the weighted average of rural and urban inequality (within areas inequality, column 3) are similar. A weighted average of the rural-urban divides (column 4) yields the Theil index for this inequality, namely 0.0284.[1] Provincial inequality, be it rural, urban, or the divide, is given by the right hand side column, column 5. Here the weighted average yields a Theil index of 0.0664, which is well above the figures of developed provinces such as Beijing and Shanghai. Add the inequality between the provinces, 0.0208, and we obtain the Theil index on the right bottom of the table, 0.0872. This figure represents the overall personal income inequality in China for the year 1992. Once more, the two contributing terms are reproduced as percentages at the bottom.

Reading the row of Theil's inequality, overall personal income inequality (0.0872) is the sum of rural-urban inequality (0.0284) and within-area inequality (0.0588), where the latter has been obtained by vertical summation of between-provinces (0.0208) and within-provinces or social inequality (0.0380). Reading the column of provincial inequality, overall personal income inequality (0.0872) is the sum of between-province inequality (0.0208) and within-province inequality (0.0664), where the latter has been obtained by horizontal summation of rural-urban inequality (0.0284) and within-area or social inequality (0.0380). Either way overall inequality consists of

33% rural-urban inequality, 24% provincial inequality, and a remainder of 43% social inequality. In section 3 we have seen that the decomposition of inequality is sensitive with respect to the order of division. In the above analysis we first divided between the rural and urban areas and then subdivided between provinces. If we would have reversed the order, overall inequality would still be the same, 0.0872, but rural-urban inequality would become 28% (instead of 33%) and provincial inequality 20% (instead of 24%); the residual social inequality would remain the same (44%), by construction.

What would competition do to inequality? We present our findings in Table 3 as relative departures from the empirical inequality statistics of Table 2. For example, the first inequality figure of Table 2 (rural inequality in Beijing: 0.0553) is increased by a factor 6.37. The last ratio of Table 3 is the most interesting one, revealing the overall inequality is increased by a factor 6.87. The rural-urban inequality goes up by a relatively modest factor of 3.74. Provincial inequality is increased by a dramatic factor, 9.96. The within sub-group or social inequality is also increased disproportionably much, namely by a factor 7.52. In short, competition would multiply inequality and the share of rural-urban inequality would diminish.

To a large extent this tendency reflects the relatively egalitarian income distribution that prevails in the initial situation, China 1992. Indeed, Appendix 3 shows the small income differences between persons. In rural areas, the highest/lowest income ratio (capitalist/unskilled) is only 15. In urban areas it is still only 20. Each social class earns more in urban than in rural areas and urban mean income is about double rural mean income. Shanghai and Guizhou are the richest and poorest provinces, respectively, but the mean income ratio is a modest 5.

Table 3. Inequality Changes from the Observed to the Competitive Economy (mobile labors)

	Rural inequality	Urban inequality	Across areas	Between areas	Provincial inequality
Eastern					
Beijing	6.37	11.35	9.92	9.53	9.87
Tianjin	3.82	3.22	2.87	10.28	3.68
Hebei	6.79	15.24	10.55	1.98	6.66
Liaoning	5.99	7.5	6.88	2.96	5.58
Shanghai	28.6	30.46	29.23	3.68	23.97
Jiangsu	5.66	3.04	4.13	0.62	2.63
Zhejiang	5.3	7.6	6.34	113.6	7.32
Fujian	13.05	4.75	8.06	5.32	7.27
Shandong	7.98	10.19	8.98	41.06	10.03
Guangdong	1.84	0.83	1.14	11.41	2.12
Middle					
Shanxi	3.61	13.49	9.4	0.86	4.9
Neimeng	1	1	1	1	1
Jilin	10.3	4.96	6.12	3.11	4.9
Heilongjiang	16.94	5.73	7.91	6.62	7.58
Anhui	9.43	9.37	11.35	0.45	5.82
Jiangxi	8.44	4.94	6.81	4.17	6.03
Henan	15.84	6.26	10.51	2.14	5.76
Hubei	7.37	8.56	8.02	2.97	5.88
Hunan	15.54	8.29	12.12	3.36	8.07
Western					
Guangxi	14.33	8.09	12.54	1.79	7.22
Hainan	1	1	1	1	1
Shichuan	3.81	6.91	4.83	1.04	3.2
Guizhou	16.89	5.7	10.3	3.53	7.29
Yunnan	7.24	6.04	6.63	1.47	3.5
Tibet	1	1	1	1	1
Shaanxi	6.63	6.69	6.6	1.62	3.4
Gansu	14.74	7.28	9.65	1.18	3.66
Qinghai	11.05	4.22	6.32	0.73	2.25
Ningxia	8.41	5.71	6.63	1.39	2.9
Xinjiang	5.89	8.29	8.23	0.5	3.7
Across provinces	8.08	6.58	7.52	3.74	5.9
Between provinces	9.39	11.99	9.96		9.96
Theil's inequality	8.64	8	8.38	3.74	6.87

5. Rural and urban inequality

The literature reviewed in section 2 found that China has less urban inequality than rural inequality, but we cannot confirm this. The rural and urban Theil indices are about the same (0.0567 and 0.0618, respectively, see Table 2). Within the two areas inequality varies quite a bit, essentially by stage of development.[2] In the less and under-developed provinces most inequality is in fact urban and, indeed, in the developed Chinese provinces there is less urban inequality than rural. One might say that the literature's finding pertains to developed China. In fact, only six provinces, all developed, show less urban inequality than rural.

All the above findings – roughly equal rural and urban inequality at the national level and less urban inequality in developed China – remain valid under perfect competition. The main reason is that Table 3 shows that the expansion factors for rural and urban inequality are roughly equal (9.75 and 8.75, respectively). Urban inequality will fall short of rural inequality in eight of the ten eastern provinces, in four of the nine middle provinces, and in one of the eleven western provinces. (Developed provinces will have many high-income people in rural areas, unlike the under-developed provinces.)

So far we have discussed the inequalities within rural and urban China. Now we turn to their differences. The literature reviewed in section 2 stressed the difference between urban and regional income levels as a result of urban economic reform. We confirm this; the rural-urban divide is substantive (0.0284, that is 33% of overall inequality, 0.0872, see Table 2). Appendix 3 shows that urban income is more than double of rural income (all per person) and that all provinces except Zhejiang show higher levels of urban than of rural income.

The rural-urban divide would multiply under competition (by a factor 3.74), but at a lower rate than overall inequality (6.87, see also Table 3). Except in the four developed provinces of Tianjin, Shandong, Zhejiang, and Guangdong, the share of rural-urban inequality gets reduced, meaning that it will be outpaced by social inequality.

6. Provincial inequality

Our analysis confirms the finding of the literature (see section 2) that eastern China stands out in terms of income and that middle and western China are not too far apart. The contribution of provincial variation to overall inequality is significant. Table 2, discussed in section 4, ascribed 24% to provincial inequality (0.0208 out of 0.0872). Competition would increase provincial inequality quite a bit. Table 3 shows it would go up almost ten fold (factor 9.96), which is much more than the rural-urban inequality increase (by a factor 3.74). One might say that China's income inequality across provinces is modest compared to the situation where they would fully reap their location (dis)advantages. It is interesting to notice that we find this competitive pressure on provincial income inequality even though we admit for labor mobility. The capital incomes are not equalized and the composition of the work force varies by province as we have seen in the sequel paper.

Table 1 reveals that, unlike Griffin et al (1999), we find a (negative) relationship between income inequality and economic development. The figures in columns 3 and 4 of Table 2 indicate that income inequality between the social classes exceeds that between the rural and urban areas in all developed provinces, in six of the nine less developed provinces, and in four of the eleven least developed provinces. Rural-urban inequality and economic development are negatively related, while rural-urban inequality correlates positively with overall inequality. Social inequality varies little

with the level of development. Under competition the rural-urban divide would become relatively less important as we have seen in the previous section and this explains why the negative relationship between inequality and development would be dissolved. Inequality would be determined by differences in factor rewards that, at least for labor, would be independent of the province or, therefore, the stage of development.

7. Conclusion

In this paper we have offered two three-way decompositions of Chinese income inequality into rural-urban, provincial, and social components. The first decomposition pertains to the observed data and the second to the income levels that would prevail if factors were rewarded according to their productivities, as under perfect competition. Competition would reduce the rural-urban divide, at least in relative terms, and dissolve the negative relationship between the level of development (across provinces) and income inequality. However, competition would skew factor rewards dramatically and hence create a lot of inequality between the social classes. Since capital stocks are immobile and call for different labor mixes across provinces, great regional differences of income would emerge. Compared to the competitive benchmark, Chinese policy is quite successful in checking inequality. As its economy is reorganized along competitive lines, skilled labor will prove to be scarce. The pressure could be alleviated by education that would improve labor skills.

Appendix 1. Data on population and personal income

The population data in terms of the eight social classes (unskilled worker, skilled worker, manager, technician, self-employed, capitalist, retiree and dependant), the rural and urban areas, and the provinces, are directly available from the China Population Census (1990), except for the number of capitalists and self-employed. The data for the labor classes (unskilled, skilled, manager and technician) are obtained from the China Population Census Vol. 2 (1990),[3] where there are eight occupations: technician, manager, staff, business, servant, farmer, worker and others. We aggregate staff, business and worker into the skilled class, and aggregate servant, farmer and others into the unskilled class. The data on retirees are available from the other three tables in the China Population Census Vol. 2 (1990).[4] The first two pertain to urban data and the third to rural data. The data on family-income dependants is obtained by subtracting the number of laborers and retirees from the total population. Because the population census data are in the year 1990, they are updated to 1992 using the 1992 population figures from the Statistical Yearbook of China (1993).[5] The data on the number of capitalists and self-employed are collected separately from the China Labor Statistical Yearbook (1993).[6] Instead of presenting the data on capitalist and self-employed directly, the China Population Census (1990) has them included in the labor categories. Therefore, to make the data consistent, a number of laborers corresponding to the number of capitalists and self-employed are subtracted from the labor categories. Neither the China Population Census (1990) nor the China Labor Statistical Yearbook (1993) provides information on the occupation of capitalists and the self-employed. It remains unclear how many of the capitalists and self-employed are either technicians, managers, skilled or unskilled. We simply assume that all the capitalists and self-employed come from the skilled class. The final data are presented in Appendix 2.

The first step to construct income data is the collection of data on urban wages. Normally, this wage includes two parts: the money wage and the social insurance and welfare funds. The China Labor Statistical Yearbook (1993) provides data on money wage by province,[7] and the data on the social insurance and welfare funds of staff and workers.[8] The urban wages must be further separated by occupation, as Chinese information authorities usually collect the wage data by sector rather than occupation. A special survey in the Yearbook of Labor Statistics of China (1993) provides a section regarding occupational wages. According to this source, the skilled wage matches the average wage, the unskilled wage amounts 0.584 of the average wage, the manager's wage 1.035 of the average wage, and the technician's wage 1.052 times of the average wage.[9] Applying these ratios to all provinces, we can disaggregate the provincial urban wage data by occupation.

Most studies estimate that capitalist income could be ten-fold the wage of a skilled worker, and self-employed income four-fold.[10] In this research, we borrow the two ratios to determine capitalist and self-employed incomes in the urban areas.

The data on retired income in urban areas are directly available from the Yearbook of Labor Statistics of China (1993).[11]

By assuming that dependants are spread equally among their families, and using a constant ratio of dependants to primary income earners,[12] we obtain dependants' income by dividing the average of the primary income earners' incomes over the dependency ratio. The primary income earners have the same net income left (after sharing their primary income with the family).

The Yearbook of Survey on Rural Households (1992) includes data on national rural households' income by education in the year 1991. We define the occupations of rural labor by education as follows: those with educational years fewer than six belong to

the unskilled, those with 7-12 years belong to the skilled, and those having over 12 years belong to the manager and the technician. In this way, rural labor's income can be split by occupation, even though the data are national macro data rather than provincial data. The survey breaks down labor by education, but not in terms of income.[13] However, the survey has data on household income by labor education.[14] Using this information as a proxy for labor income by education,[15] it can be derived that in rural areas the technicians' and managers' incomes are the same, namely 1.37 times the average, 1.34 times the skilled, and 1.59 times the unskilled labor wage. (This estimate is consistent with the common recognition that in rural areas technicians and managers earn a high income, common to both, and that skilled and unskilled labor wages are low, also at a common level. Technicians and managers are paid urban wages, while the unskilled and skilled workers are residual claimants.) By applying these ratios to the provinces, we break down rural income by occupation or skill, as well as by province.

We estimate the income of rural capitalists and self-employed by assuming that rural capitalists and rural self-employed earn ten respectively four times the rural skilled wage, as we did for the urban incomes. Rural retirees receive the same income as urban retirees. The rural dependant income equals to the rural households' mean income, which is directly available from the China Statistical Yearbook (1993).[16] The final data are presented in Appendix 3.

Appendix 2. 1992 Population in China[17]

Eastern	BJ	TJ	HB	LN	SH	JS	ZJ	FJ	SD	GD
Rural unskilled	866858	1107746	25642777	9326260	1053773	24566410	11576084	9612977	34129906	17959349
Rural skilled	407383	222743	42559	845708	1575239	6859832	3667196	1524030	52544	2010768
Rural manager	50628	26029	147691	130956	78436	574097	148838	80137	225585	129161
Rural technician	84921	53553	565004	376870	164136	998949	398194	363176	835486	412357
Rural self-employed	160865	95743	1653653	439673	104140	1101917	1456627	400015	2373151	1173421
Rural capitalist	599	6649	14784	6364	4389	6507	16911	7085	13390	27492
Rural retiree	33114	17375	273196	167245	148256	483125	178704	140144	341026	281656
Rural dependant	1323908	1270754	22353882	8333590	1410663	19620942	11713375	12378061	24584733	19272202
Rural population	2928276	2800592	50693546	19626666	4539032	54211779	29155929	24505625	62555821	41266406
Urban unskilled	823183	720507	1973178	2645268	584655	1927493	2503955	947115	6645257	4256586
Urban skilled	2460982	2156565	3419409	6220334	3298110	4975721	3870447	1654209	5251203	6199681
Urban manager	376242	191158	358758	696926	282544	636791	262927	130018	457677	471232
Urban technician	976299	594502	1024697	1597977	887702	1275515	915195	492557	1502633	1474986
Urban self-employed	117804	46516	183928	472894	79090	210288	283895	242530	296721	763701
Urban capitalist	15360	9342	6093	19782	11601	16385	17086	54533	16080	73095
Urban retiree	724366	510376	542809	1592882	1350286	1110513	655528	329770	731107	1049934
Urban dependant	2597535	2170440	4548201	7288136	2416981	4745513	4695051	2803633	8643502	9692481
Urban population	8091771	6399406	12057073	20534199	8910969	14898219	13204084	6654365	23544180	23981696
Dependency ratio	0.473	0.513	0.606	0.55	0.372	0.467	0.552	0.728	0.58	0.678
Total population	11020047	9199998	62750619	40160865	13450001	69109998	42360013	31159990	86100001	65248102

Appendix 2. 1992 Population in China (continued)

Middle	SX	NM	JL	HLJ	AH	JX	Hen	Hub	Hun
Rural unskilled	9270061	6707771	6975122	8178501	26467638	14856940	41049622	21130853	26863862
Rural skilled	557680	275091	320164	511357	914910	956758	1025825	902474	1195240
Rural manager	93304	61229	58740	108726	159854	112621	254606	151391	154599
Rural technician	338984	240144	241584	351239	547337	445507	993937	528277	602401
Rural self-employed	587676	193310	162505	152295	773824	590272	901166	654851	782226
Rural capitalist	11717	1662	1004	380	3019	3256	8231	1387	5846
Rural retiree	144714	60748	57175	165499	194696	202132	320295	168436	335698
Rural dependant	10197038	6510231	6803037	9307183	18869465	13998329	30558240	16221241	21429096
Rural population	21201174	14050186	14619331	18775180	47930743	31165815	75111922	39758910	51368968
Urban unskilled	1084208	1024358	1100966	1975755	1750715	1271044	2401093	2897862	2024164
Urban skilled	2376805	1954824	2854180	4361251	2680352	1875904	3497060	4361328	2801376
Urban manager	278229	201952	295529	524770	283010	193682	417715	438279	323793
Urban technician	729725	617411	858205	1240598	758248	592710	1074305	1288475	926929
Urban self-employed	154958	230212	336786	464219	409499	312093	368858	279548	367627
Urban capitalist	4615	4117	4778	9230	3326	3754	3943	4995	6902
Urban retiree	324393	346321	616772	982098	494470	384179	566840	785556	620861
Urban dependant	3635792	3640621	4633456	7746814	4029636	3330819	5168228	5985025	4229392
Urban population	8588725	8019816	10700672	17304735	10409256	7964185	13498042	16041068	11301044
Dependency ratio	0.734	0.831	0.764	0.811	0.632	0.719	0.62	0.595	0.598
Total population	29789899	22070002	25320003	36079915	58339999	39130000	88609964	55799978	62670012

Appendix 2. 1992 Population in China (end)

Western	GX	HN	SC	GZ	YN	TB	Six	GS	QH	NX	XJ
Rural unskilled	19173645	2314405	53560310	14653369	17370544	894046	13474257	10219588	1651373	1719946	4781473
Rural skilled	147022	203049	1116132	160545	354377	43601	344610	59693	100307	29967	221014
Rural manager	90158	16845	172154	51317	84298	12863	74904	54628	14611	12556	48400
Rural technician	397080	78775	925725	237399	376764	49155	345036	198365	79054	48059	195241
Rural self-employed	545070	66887	1374038	196583	397675	14862	407374	264199	28951	48185	174221
Rural capitalist	3660	894	7410	4186	1394	1	4333	2280	361	469	1479
Rural retiree	121342	108280	543396	73417	162615	8249	124473	37435	13518	11665	125893
Rural dependant	16810368	2428165	30286707	11766952	13859138	994629	11942893	7213054	1515380	1732716	5123878
Rural population	37288345	5217300	87985872	27143768	32606805	2017406	26717880	18049242	3403555	3603563	10671599
Urban unskilled	889196	256836	5394754	1495736	1145500	33059	1023015	908238	112351	138315	538664
Urban skilled	1485203	282638	5281343	1142853	1309144	43655	1946758	1248429	323520	333784	1156415
Urban manager	191802	37609	426881	130045	132736	8748	233267	149210	37075	38742	145341
Urban technician	524734	125216	1702855	427361	499168	25424	708435	413525	106240	121541	431536
Urban self-employed	313935	91127	483389	186253	142059	25863	179326	105429	40952	27034	185482
Urban capitalist	8002	14529	7721	4664	1331	16	3030	2844	563	1376	2900
Urban retiree	325262	62107	1385758	257950	306219	10706	387123	194864	53891	56073	328993
Urban dependant	2773536	772638	7311433	2821369	2176994	115124	2851035	2068218	531853	549764	2349076
Urban population	6511670	1642700	21994134	6466231	5713151	262595	7331989	5090757	1206445	1266629	5138407
Dependency ratio	0.742	0.882	0.498	0.774	0.616	0.781	0.636	0.684	0.788	0.767	0.842
Total population	43800015	6860000	10998000	33609999	38319956	2280001	34049869	23139999	4610000	4870192	15810006

Appendix 3. 1992 Income in China

Eastern	BJ	TJ	HB	LN	SH	JS	ZJ	FJ	SD	GD
Rural unskilled	1352	1126	587	856	1914	912	1169	846	691	1125
Rural skilled	1610	1340	698	1019	2279	1086	1392	1008	822	1339
Rural manager	2154	1793	934	1363	3050	1454	1862	1348	1100	1792
Rural technician	2154	1793	934	1363	3050	1454	1862	1348	1100	1792
Rural self-employed	6439	5362	2793	4076	9118	4346	5566	4030	3289	5358
Rural capitalist	16097	13404	6984	10189	22794	10865	13916	10076	8223	13394
Rural retiree	3128	2816	2878	2675	3416	2662	2858	2403	2635	3105
Rural dependant	1572	1309	682	995	2226	1061	1359	984	803	1308
Rural mean	1827	1429	720	1026	2433	1090	1524	998	853	1372
Urban unskilled	1562	1125	1039	1071	2071	1290	801	1029	672	1084
Urban skilled	2675	1927	1778	1834	3545	2208	1372	1762	1151	1856
Urban manager	2769	1994	1840	1898	3669	2285	1420	1824	1191	1921
Urban technician	2814	2027	1870	1930	3729	2323	1443	1854	1211	1953
Urban self-employed	10729	7716	7115	7320	14174	8830	5494	7032	4598	7418
Urban capitalist	26822	19289	17787	18299	35434	22074	13735	17580	11496	18546
Urban retiree	3128	2816	2878	2675	3416	2662	2858	2403	2635	3105
Urban dependant	2464	1776	1545	1618	3369	1993	1166	1502	916	1562
Urban mean	2719	1935	1718	1876	3539	2183	1375	1910	1031	1890
Overall mean	2482	1781	912	1461	3166	1326	1477	1193	901	1562

Appendix 3. 1992 Income in China (continued)

Middle	SX	NM	JL	HLJ	AH	JX	Hen	Hub	Hun
Rural unskilled	539	578	694	816	494	660	506	583	636
Rural skilled	642	688	826	972	588	786	602	694	757
Rural manager	859	921	1106	1300	786	1052	806	929	1012
Rural technician	859	921	1106	1300	786	1052	806	929	1012
Rural self-employed	2568	2753	3305	3887	2351	3146	2408	2777	3027
Rural capitalist	6420	6881	8264	9718	5878	7864	6021	6943	7567
Rural retiree	2602	2403	2399	2462	2290	2130	2439	2179	2391
Rural dependant	627	672	807	949	574	768	588	678	739
Rural mean	664	670	794	938	569	777	577	673	736
Urban unskilled	964	814	863	851	838	825	922	787	990
Urban skilled	1651	1394	1478	1457	1434	1413	1578	1348	1696
Urban manager	1709	1443	1529	1508	1484	1462	1633	1395	1756
Urban technician	1737	1466	1555	1532	1509	1486	1660	1418	1784
Urban self-employed	6585	5564	5908	5822	5738	5664	6316	5388	6786
Urban capitalist	16463	13910	14770	14556	14346	14161	15789	13470	16965
Urban retiree	2602	2403	2399	2462	2290	2130	2439	2179	2391
Urban dependant	1466	1195	1288	1260	1178	1157	1322	1150	1410
Urban mean	1628	1406	1538	1488	1456	1426	1541	1295	1685
Overall mean	942	937	1109	1201	727	909	724	852	907

Appendix 3. 1992 Income in China (end)

Western	GX	HN	SC	GZ	YN	TB	Six	GS	QH	NX	XJ
Rural unskilled	630	725	545	435	531	714	481	421	519	508	636
Rural skilled	750	863	649	518	633	850	572	501	617	605	758
Rural manager	1003	1155	869	693	847	1137	766	670	826	810	1014
Rural technician	1003	1155	869	693	847	1137	766	670	826	810	1014
Rural self-employed	2998	3453	2597	2073	2531	3400	2290	2003	2470	2421	3031
Rural capitalist	7496	8632	6492	5181	6328	8499	5724	5007	6175	6052	7578
Rural retiree	2519	2279	2300	2394	2825	3956	2422	2905	3533	2741	2760
Rural dependant	732	843	634	506	618	830	559	489	603	591	740
Rural mean	723	862	624	487	610	820	559	481	597	587	762
Urban unskilled	1038	1382	821	642	1091	1734	972	1026	1301	1143	1253
Urban skilled	1778	2367	1405	1100	1868	2969	1663	1756	2228	1957	2145
Urban manager	1840	2450	1455	1139	1934	3072	1721	1818	2305	2026	2220
Urban technician	1870	2490	1478	1157	1965	3123	1750	1848	2343	2059	2256
Urban self-employed	7130	9467	5624	4403	7482	11894	6641	7033	8885	7831	8550
Urban capitalist	17825	23667	14060	11008	18704	29735	16604	17583	22213	19578	21375
Urban retiree	2519	2279	2300	2394	2825	3956	2422	2905	3533	2741	2760
Urban dependant	1460	2042	1135	861	1536	2159	1445	1488	1957	1756	1830
Urban mean	1866	2650	1332	1048	1791	3398	1660	1688	2328	1972	2200
Overall mean	893	1290	766	595	786	1117	796	746	1050	947	1230

Appendix 4. Transforming competitive functional into personal incomes

Let IK_s^j denote capital income, where *j = 1, ..., 27* represent provinces and *s = 1, ..., 30* sectors. Let K and γ denote employed capital and rental rates. Capital income in the agricultural sector is

$$IK_a^j = K_1^j \gamma_1^j .$$

Capital income in the sectors of industry, construction, transports and communications, and commerce is

$$IK_b^j = \sum_{s=2}^{26} K_s^j \gamma_s^j .$$

Capital income in the sectors of public service, culture and education, finance and insurance, and administration is

$$IK_c^j = \sum_{s=27}^{30} K_s^j \gamma_s^j .$$

The model determines directly the unskilled wage rate and the wage premiums for the technicians, the managers, and the skilled.

In the agricultural sector, all capital belongs to farmers, who, however, are not capitalists. The rural capitalists hold their capital in sectors such as industry, commerce and construction. Capital income in the agricultural sector is distributed to all farmers who hold own capital, whereas the rural capitalists receive rent in non-agricultural sectors.

State and private capital exist mainly in the sectors of industry, commerce, and construction. Using the data on capital ownership in industrial sectors by province from The Third National Industrial Census of China in 1995, we calculate the proportions of

private capital in total capital, and apply them to the data in 1992 to get the amounts of private capital in industrial sectors for 1992. Since the data on capital ownership in commerce and construction sectors are unavailable, we assume that the private share of total capital is the same as in the industrial sector. Public service, education and culture, finance and banking, and administration are dominated by state capital. We assume that the government collects all capital income in these sectors.

Few people have capital and even less hold enough to rely on it for income. We simply assume that the people who own significant amounts of capital are capitalists, and that the capitalist is the sole earner of private capital income. The capitalist's income is separated from total capital income, which includes both government and private capital incomes, according to the share of private capital in total capital. Denoting

α the share of private capital income in total capital income,

I capitalists' average income,

N the number of capitalists,

The last step is to put

$$I^j = \alpha^j IK_b^j / N^j .$$

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[1] Notice that the variation of this statistic between provinces is meaningless; this is why Table 2 has an empty cell in column 4.

[2] Administratively, China has 30 provinces. Along the east coast, there are ten provinces: Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangshu, Zhejiang, Fujian, Shandong, and Guangdong. In 1994, this part was home to 36.5% of China's population and contributed 55.6% to national GDP. (The data are from the 1995 China Statistical Yearbook.) Per capita GDP for the east coast was 5720 Yuan. In the middle part of the country, there are nine provinces: Shanxi, Neimeng, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hunan and Hubei. This part was home to 35.6% of China's population and contributed 27.6% to national GDP. Per capita GDP in the middle part was 2913 Yuan. The western part has the remaining 11 provinces: Guangxi, Hainan, Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang. This part was home to 27.9% of China's population and contributed 16.8% to national GDP. Per capita GDP in the western part was 260 Yuan. The eastern, middle and western parts are referred to, respectively, as developed, less-developed and under-developed zones.

[3] Table 6-15 "City Working Persons by Two Digits Classification of Occupation and Province", Table 6-16 "Town Working Persons by Two Digits Classification of Occupation and Province", and Table 6-17 "County Working Persons by Two Digits Classification of Occupation and Province" in the China Population Census Vol. 2 (1990). Among the three, the first two are for urban data, and the third is for rural data.

[4] Table 6-28 "City Non-working Persons by Province", Table 6-29 "Town Non-working Persons by Province", and Table 6-30 "County Non-working Persons by Province" in the China Population Census Vol. 2 (1990).

[5] Table 3-3 "Total Population, Birth Rate, Death Rate, and Natural Growth Rate of Population by Province, 1992" in the Statistical Yearbook of China (1993).

[6] Table 6-3 "Urban Employment in Private Enterprises and Individual Households by Province" and Table 6-4 "Rural Employment in Private Enterprises and Individual Households by Province" in the China Labor Statistical Yearbook (1993).

[7] Table 1-65 "Number and Total Wage Bill of Staff and Workers by Province" in the China Labor Statistical Yearbook (1993).

[8] These are presented in four other separate tables, Table 9-20 "Composition of Total Social Insurance and Welfare Funds of Staff and Workers in State-owned Units by Province", Table 9-31 "Composition of Total Social Insurance and Welfare Funds of Staff and Workers in Urban Collectively-owned Units by Province", Table 9-34 "Composition of Total Social Insurance and Welfare Funds of Staff and Workers in Units of Other Ownership by Province", and Table 9-36 "Composition of Total Social Insurance and Welfare Funds of Staff and Workers in Foreign Funded Enterprises by Province". The average of these tables is the total social insurance and welfare funds of staff and workers by province.

[9] In the Yearbook of Labor Statistics of China (1993), Table 7-13 "Increase Rate of Wages of 14 Cities' and Counties' Staff and Workers" gives the average wages by occupation in October, 1992 as follows: unskilled 150.62 Yuan, skilled 257.87 Yuan, technician 271.22 Yuan, and manager 266.87 Yuan. In other words, the technician's wage is 1.016 over the manager's wage, 1.052 over the skilled, and 1.8 over the unskilled. Since the average of the wages is 257.89 Yuan, it can be seen that the unskilled worker's wage equals 0.584 of the average, the skilled worker's wage equals the average, the manager's wage equals 1.035 of the average, and the technician's wage equals 1.052 of the average.

[10] See Zhong (1989), Yang and Shao (1989), Chu (1990), Li (1990), Luo (1989), and Zhao (1992).

[11] In the Yearbook of Labor Statistics of China (1993), there are four tables used: Table 9-25 Composition of Total Social Insurance and Welfare Funds of Staff and Workers under Termination, Retirement and Resignation in State-owned Units by Province", Table 9-32 "Composition of Total Social Insurance and Welfare Funds of Staff and Workers under Termination, Retirement and Resignation in Urban Collectively owned Units by Province", Table 9-35 "Composition of Total Social Insurance and Welfare Funds of Staff and Workers under Termination, Retirement and Resignation in Units of Other Ownership by Province", and Table 9-37 "Composition of Total Social Insurance and Welfare Funds of Staff and Workers under Termination, Retirement and Resignation in Foreign Funded Enterprises by Province". The weighted averages of the incomes in these tables are calculated to get the retired income in urban areas.

[12] In this research, retirees are not supposed to afford any dependants.

[13] Table 3-2 "Rural Labors' Quality by province" in the survey.

[14] Table 2-5 "The Main Indicators of Rural Households by Labor's Education" in the survey.

[15] As a result, unskilled income is 611.67 Yuan, skilled 725.83 Yuan, and Manager's and Technician's 971.56 Yuan. The average income of rural households, moreover, is 708.55 Yuan in 1991. Assume that technician’s and manager's incomes are the same, their income is thus 1.37 times more than the average, 1.34 times more than the skilled, and 1.59 more than the unskilled. The skilled income is 1.19 times more than the unskilled.

[16] Table 8-23 "Net Income of Peasant Household Per Capita by Province" in China Statistical Yearbook (1993).

[17] See Table 2 for province codes.